Chapter 1: Getting Started

1. Hello World!

Every C++ program must have exactly one global function named `main()`. The program starts by executing that function. The `int` value returned by `main()`, if any, is the program's return value to "the system." If no value is returned, the system will receive a value indicating successful completion. A nonzero value from `main()` indicates failure.

Not every operating system and execution environment make use of that return value: Linux/Unix-based environments often do, but Windows-based environments rarely do.

Typically, a program produces some output. Here is a program that writes `Hello, World!`

Hello.cpp

```
#include <iostream>

    int main(){
    std::cout << "Hello World!\n";
    return 0;
}
```

(Visual Studio Express 2013 Demo)

The line `#include <iostream>` instructs the compiler to include the declarations of the standard stream I/O facilities as found in `iostream`. Without these declarations, the expression

```
std::cout << "Hello World!\n";
```

would make no sense. The operator `<<` ("put to") writes its second argument onto its first. In this case, the string literal `"Hello, World!\n"` is written onto the standard output stream `std::cout`. A string literal is a sequence of characters surrounded by double quotes. In a string literal, the backslash character `\` followed by another character denotes a single "special character." In this case, `\n` is the newline character. The `std::` specifies that the name `cout` is to be found in the standard-library namespace.

2. A More Serious Program

Problem statement: a bookstore keeps a file of transactions. Each transaction records the sale of a given book and contains an ISBN (International Standard Book Number, a unique identifier assigned to most books published throughout the world), the number of copies sold, and the price at which each copy was sold. Each transaction looks like

```
0-201-70353-X 4 24.99
```

where the first element is the ISBN, the second is the number of books sold, and the last is the sales price.

(PPT)

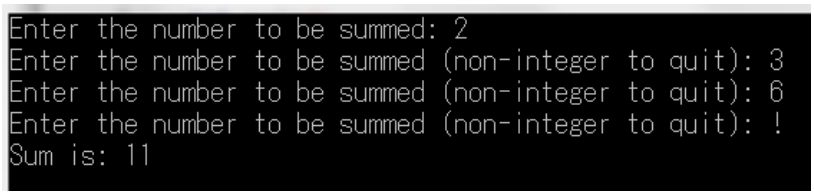
Reading an Unknown Number of Inputs

C++ 101: Write a program that sums from 0 to 9 using `for` loop control and print the sum.

Sum.cpp

A:

A logical extension of this program would be to ask the user to input a set of numbers to sum. In this case, we won't know how many numbers to add. Instead, we'll keep reading numbers until there are no more numbers to read. Write a program and use `while` loop for the task.



AddSum.cpp

A:

(PPT)

Introducing Classes

(Reading and writing Sales_item object)

ItemIO.cpp

```
#include <iostream>
#include "Sales_item.h"
int main()
{
    Sales_item book;
    // read ISBN, number of copies sold, and sales price
    std::cin >> book;
    // write ISBN, number of copies sold, total revenue, and average
    // price
    std::cout << book << std::endl;
    return 0;
}
```

Q: If the input to the program is 0-2-1-70353-X 4 24.99, what is the output?

A:

(Adding two Sales_item objects)

AddItem.cpp

```
#include <iostream>
#include "Sales_item.h"
int main()
{
   Sales_item item1, item2;
   std::cin >> item1 >> item2;   // read a pair of transactions
   std::cout << item1 + item2 << std::endl; // print their sum
   return 0;
}
```

Q: If the inputs to the program are 0-2-1-70353-X 4 20.0 and 0-2-1-70353-X 3 20.0, what will be the output?

A:

(Class Member Function) A member function is a function that is defined by a class. Member functions are defined once for the class but are treated as members of each object. We refer to these operations as member functions because they usually operate on a specific object. A dot operator is used to call a member function.

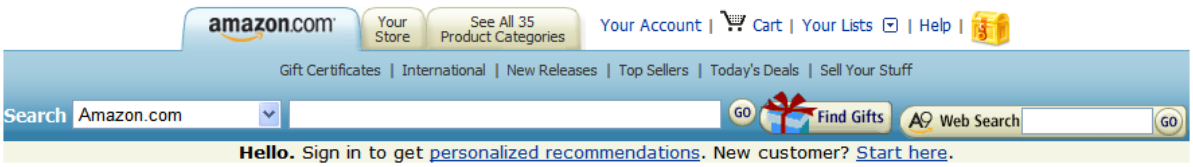
AddItemCheck.cpp

```
#include <iostream>
#include "Sales_item.h"

int main()
{
    Sales_item item1, item2;

    std::cin >> item1 >> item2;
    // first check that item1 and item2 represent the same book
    if (item1.isbn() == item2.isbn()) {
        std::cout << item1 + item2 << std::endl;
        return 0;   // indicate success
    } else {
        std::cerr << "Data must refer to same ISBN"
                  << std::endl;
        return -1;  // indicate failure
    }
}
```

Q: where is the member function? What is its behavior?

A:

(Put things together and solve the problem)



(Our Task) write a program so we can

- read from the file with transactions
- computes the number of copies of each title sold
- the total revenue (總收入) from that book
- the average sales price.

To ease our life for now, we'll **assume** that all of the transactions for a given ISBN appear together.

(The Input File)

book_sales

```
0-201-70353-X 4 24.99
0-201-82470-1 4 45.39
0-201-88954-4 2 15.00
0-201-88954-4 5 12.00
0-201-88954-4 7 12.00
```

```
0-201-88954-4 2 12.00
0-399-82477-1 2 45.39
0-399-82477-1 3 45.39
0-201-78345-X 3 20.00
0-201-78345-X 2 25.00
```

(The Logics)

- Our program will combine the data for each ISBN in a `Sales_item` object named `total`.
- Each transaction we read from the standard input will be stored in a second `Sales_item` object named `trans`.
- Each time we read a new transaction we'll compare it to the `Sales_item` object `total`.
- If the objects refer to the same ISBN, we'll update `total`. Otherwise we'll print the value in `total` and reset it using the transaction we just read.

(The Code)

AvgPrice.cpp

```
#include <iostream>
#include "Sales_item.h"

int main()
{
    Sales_item total; // variable to hold data for the next transaction

    // read the first transaction and ensure that there are data
    if (std::cin >> total) {
        Sales_item trans; // variable to hold the running sum
        // read and process the remaining transactions
        while (std::cin >> trans) {
            // if we're still processing the same book
            if (total.isbn() == trans.isbn())
                total += trans; // update the running total
            else {
                // print results for the previous book
                std::cout << total << std::endl;
                total = trans;  // total now refers to the next book
            }
        }
        std::cout << total << std::endl; // print the last transaction
    } else {
        // no input! warn the user
        std::cerr << "No data?!" << std::endl;
        return -1;  // indicate failure
    }

    return 0;
}
```

Q: what are the outputs?

A: